	Type	L #	Hits	Search Text	DBs	Time Stamp
1	BRS	L1	241290	(feed or feeder or feeding or fed) near5 (transport or transported or transporting or convey or conveyor or conveying or move or moved or moving)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:51
2	BRS	L2	272662	(scan or scanned or scanning or image or imager or imagined or imaging or optic or optically or optical) near5 (transport or transported or transporting or convey or conveyor or conveying or move or moved or moving)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:51
3	BRS	L3	103855	(label or labeler or labeled or labeling or print or printed or printer or printing) near5 (transport or transported or transporting or convey or conveyor or conveying or move or moved or moving)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:51
4	BRS	L4	4457	1 and 2 and 3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:52
5	BRS	L5	40903	(scan or scanned or scanning or image or imager or imagined or imaging or optic or optically or optical) near5 (return or sender or addresser or origin)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:52

	Type	L #	Hits	Search Text	DBs	Time Stamp
6	BRS	L6	55404	(scan or scanned or scanning or image or imager or imagined or imaging or optic or optically or optical) near5 (address or addressee or recipient or destination)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:52
7	BRS	L7	5005	5 and 6	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:53
8	BRS	L8	4426	6 near5 (change or changed or changing or modify or modified or modifying or modification or alter or altered or altering or alteration or new or correct or corrected or correcting or correction or forward or forwarded or forwarding)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:53
9	BRS	L9	146154	(scan or scanned or scanning or image or imager or imagined or imaging or optic or optically or optical) near5 (notify or notified or notifying or notification or indicate or indicated or indicating or indication or announce or announcement or announced or announcing)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:54

	Type	L #	Hits	Search Text	DBs	Time Stamp
10	BRS	L10	49821	(return or sender or addresser or origin) near5 (notify or notified or notifying or notification or indicate or indicated or indicating or indication or announce or announcement or announced or announcing)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:55
11	BRS	L11	1187	(8 or 9) same 10	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:56
12	BRS	L17	67	4 and 7	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:58
13	BRS	L18	8	4 and 11	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 20:58
14	BRS	L19	205	7 and 11	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 21:00
15	BRS	L20	272	17 or 18 or 19 Scanned Ti, Ab, Kwic all	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 21:00

	Type	L #	Hits	Search Text	DBs	Time Stamp
16	BRS	L21	218	("04185067" or "11249205").pn. or ((@pd<="19710101" not @pd<="19470101") and (209/584 or 209/900 or 382/100 or 382/101 or 382/102 or 705/1 or 705/400).ccls.) Scanned Ti, Ab, Kwic all	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/01/31 21:10

	Document ID	Issue Date	Inventor	Current OR	Current XRef	Pages
1	JP 04185067 A	19920701				10
2	US 6521854 B2	20030218	Tanimoto; Michiaki	209/586	209/592; 209/645; 209/900	16
3	US 6484886 B1	20021126	Isaacs; Gerald A. et al.	209/539	198/368; 198/457.02; 209/583; 209/586; 209/592; 209/656; 209/918	21
4	US 6435404 B1	20020820	Feick; William Kurt	229/303	229/71; 229/72	12
5	US 6401936 B1	20020611	Isaacs; Gerald A. et al.	209/656	198/367.1; 198/531	21
6	US 4832204 A	19890523	Handy; Steven W. et al.	209/3.3	209/556; 209/564; 209/583; 209/698; 235/385; 340/5.92; 700/224	9
7	US 20020029202 A1	20020307	Lopez, Steven W.	705/406		26

L20 results

	Document ID	Issue Date	Inventor	Current OR	Current XRef	Pages
1	JP 04185067 A	19920701				10
2	JP 11249205 A	19990917	KIKUCHI, YUKIO			4
3	JP 04185067 A	19920701	YAMADA, TEIICHI et al.			10
4	US 3420368 A	19690107	SORRELLS JOHN R et al.	209/566	209/584; 209/900; 271/111; 271/305	9
5	US 3368672 A	19680213	RICHARD HEANEY et al.	209/3.3	209/565; 209/569; 209/900; 209/905	8
6	US 3246751 A	19660419	WILLIAM BRENNER et al.	209/569	209/562; 209/657; 209/900	11
7	US 2775405 A	19561225	LOUIS PASTON	235/488	101/389.1; 209/584; 209/900; 229/68.1; 283/116; 283/71; D19/3	3
8	US 2669365 A	19540216	ROBERT GOURDON	198/349	209/900	20

L21 results

PAT-NO: JP404185067A
DOCUMENT-IDENTIFIER: JP 04185067 A
TITLE: DESTINATION ERROR CORRECTING SYSTEM
PUBN-DATE: July 1, 1992
INVENTOR-INFORMATION:
NAME
YAMADA, TEIICHI
OOYA, KAZUAKI
HANZAWA, NOBUO
HASEGAWA, MITSUSHIGE
INT-CL (IPC): H04N001/32, H04N001/00

ABSTRACT:

PURPOSE: To eliminate the need or the reinputting of image information, by inputting information of storing consecutive numbers, etc., and corrected destination data from a facsimili equipment and transmitting the corrected destination data of the image information to the other facsimili equipment by a store and forward switching system when the destination data has an error.

CONSTITUTION: When the data transmitted from a transmission side facsimili equipment (FAX) 101 has the error in the destination, the store and forward switching device 201 informs a device 101 together with the information of the data storing consecutive numbers, etc. When the corrected destination data is inputted from the device 101, the device 201 generates a new transmission data which has the corrected destination of the image information of the corresponding transmission data among the transmission data stored in an external storage device 11, replaces the transmission data with the new one and the data is stored in the device 111. Then the device 201 transmits this transmission data to the other facsimili 102. In such a manner, when the destination data has the error, the once read-in image information is efficiently used to be transmitted.

PAT-NO: JP411249205A
DOCUMENT-IDENTIFIER: JP 11249205 A
TITLE: PERSONAL POSTAGE STAMP PRINTING METHOD AND PRINTING SHEET USED FOR THIS PRINTING METHOD
PUBN-DATE: September 17, 1999
INVENTOR-INFORMATION:

NAME	COUNTRY
KIKUCHI, YUKIO	N/A

INT-CL (IPC): G03B015/00, G09F003/00 , G11B023/38

ABSTRACT:

PROBLEM TO BE SOLVED: To provide a personal postage stamp printing method and a printing sheet used for this printing method enabling a purchaser to personally select the figure, design, photograph, and the like of postage stamps so as to be the own memorial stamps of the purchaser while being able to specify the purchaser.

SOLUTION: A printing sheet 1 comprises a separator 2 and a plurality of seals 3A for personal postage stamps removably fitted to the separator 2. The amount of money 6 and the name of an organ 7 with authority of issuance are previously printed on the seal 3A. A person who purchased the printing sheet 1 prints desirably on a plurality of seals 3A for personal postage stamps and takes the individual seals 3A off to use them as postage stamps.

US-PAT-NO: 4832204
DOCUMENT-IDENTIFIER: US 4832204 A
TITLE: Package handling and sorting system
DATE-ISSUED: May 23, 1989
INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Handy; Steven W.	Pittsburgh	PA	N/A	N/A
Everman; E. Roger	Wexford	PA	N/A	N/A
Bloom; Gordon N.	Sewickley	PA	N/A	N/A
Johnson; Bram B.	Sewickley	PA	N/A	N/A

US-CL-CURRENT: 209/3.3, 209/556 , 209/564 , 209/583 , 209/698 , 235/385 , 340/5.92 , 700/224

ABSTRACT: The invention relates to a package handling and sorting system which sorts small packages according to destination, segregating those with the same destinations for combined shipments. The system depends on a unique combination of conveying equipment automatically controlled by programmed data processing units which utilize data obtained by scanning electronically readable package labels, as well as other information and detection equipment, to examine packages introduced into the system, and to transfer those consigned to the same location to vehicles routed to such locations. The system also generates an electronic trail of package movements, thus providing the capability to trace packages lost in transit.
6 Claims, 9 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 4

--------- KWIC ---------

Brief Summary Text - BSTX (3): Specifically, this invention relates to an electro-mechanical small package shipping system which entails collecting such packages from their various points of origin, which packages have affixed to them optically scannable bar code labels containing shipper information, and marshalling the packages at a central processing point where the affixed information is optically scanned. Information thus obtained, together with other information obtained from an address label, a package pick-up report, and address correction information, is directed through electronic data processing units which use the information to direct a mechanical sorting array that manages the packages, including sorting them according to destination areas. The data processing units also compile retrievable information data regarding the packages processed up to the time at which they are delivered to their various points of destination.

Detailed Description Text - DETX (10): FIG. 4 shows a package 38 with barcode label 30 and address label 40 attached thereto being scanned by a hand-held laser scan device 42. In the package handling system contemplated by the invention, upon initial receipt at the origin terminal 22, a package 38 is placed on a conveyor belt where it is subjected to a laser scan of the barcode label 30 to determine the package's

identification number. The address label is read, the destination code is keyed into the information network, while the weight of the package is ascertained as it moves over a scale, the weight data also being added to the system's electronic information network. The procedure described, referred to as a SWAK, i.e., scan, weigh and key operation, may be performed at the origin terminal 22, or at hub 24 in those instances when the package initially enters the system at a hub location.

Detailed Description Text - DETX (11): FIG. 5 is a semi-schematic, pictorial diagram showing the concept of the sortation operation as practiced at hub 24 in the process of the invention. Direction of movement in the Figure is shown by means of arrows adjacent to the components illustrated. At the hub, packages received are inducted into a tilt tray sorter system 43 for segregation according to destination area. In the induction process the packages 38 are transferred from the truck in which they are received at the hub 24 to an induction conveyor system which includes a feed conveyor 44 and an induction conveyor 46. The incoming packages 38 are placed on the feed conveyor 44, barcode label 30 side up, which delivers them onto the induction conveyor 46 from which the packages 38 are loaded directly onto tilt trays 48. The tilt trays are continuously carried on an endless conveyor chain carousel 49 past package discharge chutes 50 located around the carousel, specific chutes corresponding to specific destination areas. When a particular package is carried to a point adjacent to a chute 50 corresponding to its destination area, a solenoid operated tip device 52 is activated, causing the tray 48 to tip as shown at 54, discharging the package 38 into the chute 50. Chute 50 transfers the package 38 by gravity to truck transit loading conveyor 56 which carries it to a truck 58 routed to the destination area of the package.

Detailed Description Text - DETX (13): In the control process, the SCS unit 62, a microprocessor, begins its control function at the package induction process. With information received from photoelectric sensors, the SCS determines the size of a particular package 38 on the induction conveyor 46 and decides whether the package will require a single tilt tray 48, or two adjacent tilt trays. The SCS coordinates such need with the availability of empty trays, temporarily stopping induction conveyor 46, as well as feed conveyor 44, until the requisite empty tray or trays 48 arrive at the discharge point of the induction conveyor. After loading, the tray 48 and a package 38 with bar code label facing up on it, pass beneath an overhead scanner 60 which identifies the package from its barcode label and relays the information to the RMP 64, another microprocessor. The RMP notifies the SCS as to the destination area of the package 38, and when the tilt tray 48 arrives at a point adjacent to a discharge chute 50 corresponding to the package's area destination, the SCS activates the solenoid tip device 52 at the chute, discharging the package 38 into it. Confirmation of the tip, and therefore of the truck assignment, is relayed back to the RMP 64 through the SCS 62.

Claims Text - CLTX (1): 1. An integrated package transfer process which involves the steps of (1) transferring bar code and address label identified packages through a successive of sorting terminals where said packages are sorted in a tilt tray sorter system that segregates packages assigned to the same geographic location based on information obtained from said labels, (2) moving packages consigned to the same

geographic location between said terminals in unitized loads, (3) periodically scanning said labels in each of said terminal as said packages pass through the terminals en route to a consignee and (4) using information obtained by such periodic scanning to control said tilt tray sorter system and said segregation, and also transferring said information to a central computer so that the location of the packages can be instantly determined.

Claims Text - CLTX (12): 4. A process according to claim 2 in which said package induction means comprises a feed conveyor and an induction conveyor, said feed conveyor receiving packages into the tilt tray sorter system and discharging said packages onto said induction conveyor which deposits them onto tilt trays, said package induction means being controlled by an electronic microprocessor which receives signals from tray sorter system detection means capable of determining when empty trays are available for package loading, said electronic microprocessor starting and stopping said feed conveyors and induction conveyors as required to control package movement during the loading process.

PGPUB-DOCUMENT-NUMBER: 20020029202
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020029202 A1
TITLE: System and methods for unified routing of mailpieces and processing sender notifications
PUBLICATION-DATE: March 7, 2002
INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Lopez, Steven W.	Orlando	FL	US	

US-CL-CURRENT: 705/406

ABSTRACT: A system and methods for routing mailpieces undeliverable as originally addressed is provided. The system and methods generate a single scan image of address block attributes that is segmented into discrete indicators for subsequent generation of forwarding addresses and sender notifications so mailpieces are processed in a single operation. The segmented image also provides the information needed to generate sender notifications when such are requested. Mailpieces to be returned to senders are similarly processed in a single operation. Multi-page mailpieces, such as magazines and articles, which cannot be delivered but which are not worth the cost of return postage, are processed by comparing the exposed portion of the mailpieces to a set of stored images to determine who the sender is so that the sender can be notified. These various operations can be performed on the same system and for differently sized mailpieces.

---------- KWIC ----------

Abstract Paragraph - ABTX (1): A system and methods for routing mailpieces undeliverable as originally addressed is provided. The system and methods generate a single scan image of address block attributes that is segmented into discrete indicators for subsequent generation of forwarding addresses and sender notifications so mailpieces are processed in a single operation. The segmented image also provides the information needed to generate sender notifications when such are requested. Mailpieces to be returned to senders are similarly processed in a single operation. Multi-page mailpieces, such as magazines and articles, which cannot be delivered but which are not worth the cost of return postage, are processed by comparing the exposed portion of the mailpieces to a set of stored images to determine who the sender is so that the sender can be notified. These various operations can be performed on the same system and for differently sized mailpieces.

Summary of Invention Paragraph - BSTX (15): [0013] Moreover, the single-scan image is stored for subsequent processing. If a sender notification indicator is detected on the mailpiece being processed, the forwarding address indicator can be culled from the stored single-scan image for subsequent use in generating a sender notification notifying the sender that the mailpiece has been forwarded.

Summary of Invention Paragraph - BSTX (17): [0015] Likewise, in place of manually sorting publications and entering data requests to identify a publisher's address in 3579

processing, relevant data groups can be culled from a single image scan of the exposed page of a publication. An image comparison between the scanned image and each of the images stored as part of a current-publications database containing cover page images and corresponding publisher addresses can then be made. When a match is achieved, a sender notification can be generated and printed. The publisher's address will be indicated on the notice generated, obviating the need as exists with current procedures for individually tearing off cover pages and manually putting them in envelopes to be addressed to a publisher once the publisher's address has been identified through manual data entry. Accordingly, even greater efficiencies over existing procedures are achieved.

Brief Description of Drawings Paragraph - DRTX (16): [0031] FIG. 14 is an elevational view of a scanned image of the front side of a letter mailpiece along with a superimposed image of a reverse-sided sender return address indicator according to the present invention;

Brief Description of Drawings Paragraph - DRTX (18): [0033] FIG. 16 is an elevational view of a scanned image of the front side of a letter mailpiece along with a superimposed image of a reverse-sided sender return address, and the corresponding image after it has been properly realigned by reverse image processing according to the present invention.

Detail Description Paragraph - DETX (5): [0037] The system 10 preferably includes a mailpiece feeder 11 that individually feeds a plurality of intermixed mailpieces. Each of the plurality of intermixed mailpieces has separate receiver location address indicators 62, sender return address indicators 72, and sender notification indicators 74 positioned thereon (see FIGS. 7-10 and 12). The system 10 also includes a mailpiece transporter 20 in position to receive from the mailpiece feeder 11 each of the plurality of mailpieces and transport each therefrom along a predetermined path of travel 21. The system 10 further includes a mailpiece scanner 25 placed downstream from the mailpiece feeder 11 and adjacent the mailpiece transporter 20 along the path of travel 21 of the plurality of mailpieces to scan the separate receiver location address indicators 62, sender return address indicators 72, and sender notification indicators 74 of each of the plurality of intermixed mailpieces to thereby create a single-scan image of address indicators and notification indicator data for each corresponding mailpiece (FIGS. 7-9). As described more fully below, the single-scan image is generated by an optical character reader, digital camera or other comparable device in order to image address and notification data (i.e., receiver location address indicator 62, sender return address indicator 72, and any sender notification indicator 74) and capture the data electronically as the mailpiece traverses the path of travel 21 in a single pass. The image so generated, moreover, is processed so as to describe the address block attributes "ABA" of each corresponding mailpiece. The resulting ABA provides in the form of digitized code a representation of mailpiece attributes, including the physical aspects of the mailpiece and its address area, thereby serving as a type of mailpiece "fingerprint" that can be stored, sorted, and retrieved in subsequent processing steps.

Detail Description Paragraph - DETX (7): [0039] The embodiment moreover further includes a process controller 16 in communication with the mailpiece scanner 25 and mailpiece labeler 28 to receive the single-scan image, separate the image into discrete data groups of at least address indicators 62, 72 and sender notification indicator 74, instruct the labeler 28 to label each of the plurality of mailpieces with a preselected routing indicator 84, and generate a sender notice 90 when desired (see FIGS. 10-12). The process controller 16 includes a forwarding address determiner 17 responsive to the receiver location address indicator 62 data group of each of the plurality of mailpieces to determine when the receiver address location indicator 62 of a corresponding mailpiece corresponds to one of a predetermined list of forwarding addresses and thereby instruct the labeler 28 to label the mailpiece with the corresponding forwarding address indicator 84 (see FIG. 9). The predetermined list of forwarding addresses is preferably a database 701 of forwarding address indicators in communication with the forwarding address determiner 17 of the process controller 16.

Detail Description Paragraph - DETX (11): [0043] As already noted, the system 10 preferably scans mailpieces electronically using an optical character reader or similar device in order to generate a single-scan image of the address and notification data 62, 72, 74 and capture the data electronically as the mailpiece makes a single pass along the path of travel 21 of the mailpiece transporter 20. With the data thus captured, software techniques as understood by those skilled in the art can easily segment the data so as to isolate for distinct processing purposes the receiver location address indicator 62, sender return address indicator 72, and any sender notification indicator 74. Having captured and segmented the data, the processor 16, for example, can utilize character comparison techniques to search for a match between the receiver location address indicators and receiver forwarding address indicators using a character image matching algorithm. The single scan image is used to generate a label that is then applied to a mailpiece. Thus, rather than processing in multiple steps requiring manual data entry, mailpieces are scanned, an image generated, and a label having the forwarding address indicator 84 thereon is applied to the mailpiece so that each mailpiece is processed in one complete cycle of system 10 operation.

Detail Description Paragraph - DETX (13): [0045] FIG. 1 illustrates, in perhaps greater detail, the method 100 of the present invention that can also be implemented by the system 10 for processing mail for forward routing. The method 100 is initiated by feeding mailpieces for scanning (Block 101) to generate a single-scan image of the receiver location address indicator 62 and any other indicators, such as barcodes, that may be positioned on a mailpiece undergoing processing. The single-scan image is segmented so that the individual address blocks having receiver location address indicators 62 and sender return address indicators 72 are separably identified along with any barcodes or other indicators that may appear on the same mailpiece (Block 103). In the subsequent step (Block 104), the address block with address indicators 62, 72 is processed, preferably utilizing an optical character reader ("OCR") as well understood by those skilled in the art. The OCR engine (Block 105) compares the receiver location address indicator 62 with a preexisting set of forwarding addresses to determine whether the mailpiece is to be forwarded. In the context of United States mail handling,

the determination made by the system 10 and related method 100 can be facilitated by using the standard USPS "ZIP+4 Lookup" system (Block 106). The OCR engine also searches the segmented image for a sender notification indicator 74, such as an address correction request on a mailpiece (Block 107). Again, in the context of domestic United States mail handling, the USPS has instituted the Address Change Service ("ACS") whereby a mailer may include on the mailpiece a USPS-approved message above the receiver location address requesting the service to notify the mailer when a mailpiece is forwarded (See USPS Publication 8, at pages 9-13). Thus, consistent with the ACS, the system 10 and method 100 not only determine whether a forwarding address match exists (Block 108), but also ascertain whether a sender notification 90 should be generated (Block 109) according to whether a sender notification indicator 74 was present on the mailpiece being processed.

Detail Description Paragraph - DETX (14): [0046] If a successful match is obtained (Block 110), a label is applied to the mailpiece, and on it is printed a receiver forwarding address indicator 84 so that the mailpiece can be appropriately forwarded. Preferably, the system 10 will include as part of the labeler an ink jet printer 29 or other printing device as understood by those skilled in the art, having the capability to print at least three discrete lines simultaneously so as to permit the appropriate forwarding address indicator 84 data to be printed on the label (Block 111) as the mailpiece travels once past the printer on the mailpiece transporter 20. Coupled with the ability to scan (Block 101), segment the single-scan image (Block 103), and determine a forwarding address match (Block 108), the system 10 allows the mailpiece to be completely processed on a single pass without the mailpiece leaving the path of travel 21 of the mailpiece transporter 20. This contrasts with conventional systems and methods which require manual keypunch entry of data in separate, additional processing steps, leading to higher costs and slower forward mail processing.

Detail Description Paragraph - DETX (16): [0048] FIG. 2 illustrates RTS processing, describing the method steps 200 of the present invention that also can be implemented by the system 10 for handling mailpieces to be returned to sender. These method steps can be carried out as a continuing part of the forward mail processing 100 as substantially described above or as an independent processing operation. The initial step of the procedure 200 is to individually scan each of a plurality of mailpieces so as to generate a single-scan image (Block 201) of address indicators. The single scan image is segmented into address blocks (Block 202) and the ABAs identified (Block 207). The address block is compared (Block 203), preferably using an OCR engine (Block 204), to determine a match between the address block indicator such as the USPS's "ZIP" 4 and the ABA (Block 206). If a match is obtained (Block 209), a label will be applied to the mailpiece, as already described, on which will be printed the sender return address indicator along with an indicator of the reason for returning the mailpiece to the sender (Block 210). The mailcarrier will have originally determined the reason for non-delivery, which can be independently indicated (Block 211). With the procedure 200, mailpieces can be processed as a batch having all mailpieces to be returned for the same reason. In addition, however, the system 10 and method 200 permit storage of address indicators specifying for each mailpiece addressed to a specific addressee the reason for

return. In any event, the system 10 and method 200 will label the mailpiece and print the sender return address indicator and reason for return as described above (Block 210).

Detail Description Paragraph - DETX (17): [0049] FIG. 2 further illustrates that for any mailpiece for which a sender return address indicator 72 is not found in the single-scan image of the front side of the mailpiece, the opposing side of the mailpiece will also have been scanned in order to image any address indicator positioned there (Block 213). If the sender return address indicator 72 is found on the reverse side of the mailpiece, the processing proceeds as already described and culminates in the mailpiece being labeled and the appropriate address indicator and reason for return printed thereon (Block 212). If no address indicator is found on either side of the mailpiece, the mailpiece is nonetheless tagged or labeled (Block 215). An identifying code indicator, preferably a barcode, is printed on the tagged or labeled mailpiece for use in subsequent processing, and the mailpiece is sorted for subsequent processing (Block 216).

Detail Description Paragraph - DETX (18): [0050] FIG. 3 illustrates the subsequent RTS second pass processing procedure 300. The procedure 300 is preferably implemented on a system utilizing a processor 16 that is a programmable computer which can be programmed for additional RTS processing. This permits the system 10 as described above to implement the steps 300 utilizing the same system devices. More specifically, the process controller is placed in rerun RTS mode (Block 301). The identifying code indicators applied to each mailpiece during the preceding RTS processing are scanned (Block 302). The scanned image is compared with a set of images stored in a database to determine whether a corresponding address and reason for no deliver at such address (Block 303). If so (Block 304), a label is applied to the mailpiece and on the label is printed a return to sender address indicator 76 along with the reason for return as determined by the comparison with the database images. If no match is made (Block 304), the mailpiece is sorted to a reject stacker for additional processing or disposal (Block 306). If the entire plurality of mailpieces has been processed (Block 307), then the procedure concludes with an end report being generated (Block 308).

Detail Description Paragraph - DETX (19): [0051] The RTS procedure 200 and second pass RTS procedure 300 as implemented by the present invention contrast with conventional procedures such as are employed by the USPS. Conventional procedures require manual notation on each mailpiece by the individual mailcarrier as to the reason for no delivery; to the degree equipment is employed by USPS in carrying out this procedure at some facilities, it has been to run mailpieces through a cancellation device that applies a notation indicating one of eight reasons for non-delivery of a mailpiece. The RTS procedure 200 and second pass procedure 300 of the present invention, however, utilize scan-generated images and character comparison algorithms that allow for creation of a single-scan image of a receiver location address indicator 62 that can be stored and correlated with an indicator for non-delivery. Having a stored location address indicator 62 that can be matched using a processor to a corresponding reason for no delivery indicator eliminates manual processing and allows for automated

generation of a label bearing an indication of the reason for no delivery as well as the sender return address indicator 72.

Detail Description Paragraph - DETX (20): [0052] FIG. 4 illustrates a 3547 processing procedure 400 according to the present invention. The 3547 procedure, as already noted, is intended to generate a notice to the sender when a mailpiece is forwarded informing the sender of the forwarding address. As already described in the context of forward mail routing, and as further illustrated in FIG. 4, each of a plurality of mailpieces utilizing the present invention is scanned (Block 401), and single-scan images of receiver location address indicators and sender return address indicators appearing on each of a plurality of mailpieces is generated. The images are stored for subsequent processing (Block 402). The receiver location address indicator 62 and sender return address indicator 72 are identified for each single-scan image (Block 403) As described above, a match is sought for each mailpiece between the receiver address location indicator 62 and a receiver forwarding address indicator 84 (Block 404), preferably using an OCR engine and character recognition algorithms for comparison of the receiver location address indicator with a list of possible return addresses from a database of addresses 701. If no match is made, the mailpiece is flagged for additional processing as earlier described (Block 405); otherwise the image is flagged for use in generating a sender notification 90. Once a determination is made that each of the plurality of mailpieces has been scanned and a comparison made (Block 406), the stored single-scan images which have been flagged for generating a sender notification 90 are sorted (Block 407).

Detail Description Paragraph - DETX (21): [0053] Once sorted, the single-scan images of receiver location and forwarding address indicators, along with the sender return address indicators, are displayed in succession (Block 408). Each image in succession is superimposed into a "postage due" template frame along with a destination indicator corresponding to the sender return address indicator 72 in a manner that will facilitate subsequent application on a separate mailpiece. In one embodiment, the destination indicator will be a barcode positioned in the lower right corner of the template frame. In subsequent processing, it is determined whether the barcode corresponds to a stored return address indicator or must be supplied by a keypunch operator (Block 409). When each of the sorted images has been thus processed (Block 410), the template frames are sorted, for example, according to the USPS "ZIP+4" system (Block 411), sized appropriately for placing on a sender notification 90 of a predetermined sized (Block 412), and printed on a separate sender notification 90 mailpiece (Block 413). In a preferred embodiment, flat size mailpieces will use a full 8.5".times.11" page (Block 414) while letter size mailpieces will be printed with two images per page (Block 415) on a printer having an automatic page cutter.

Detail Description Paragraph - DETX (22): [0054] Once the sorted images have been processed, sized, and framed for placement on a sender notification 90 of a predetermined size as just described, the image can be sent to any destination for printing a corresponding sender notification 90 mailpiece label. Preferably, the system 10 thus includes one or more remote site printers 800 for performing destination

printing. Each destination printer, moreover, is linked to the system processor 16 via a local area network (LAN), the Internet, or any other localized or global communications network as well understood by those skilled in the art.

Detail Description Paragraph - DETX (24): [0056] As noted above, the USPS defines letters as being larger than 3" wide.times.5" long .times.0.007" thick and smaller than 6.125" wide.times.11.5" long.times.0.25" thick, and flats as larger than letters but smaller than 10" wide.times.13" long.times.0.75" thick. In the present context, it is worth noting that sender notification or other address service request indicators, such as the ACS barcode indicator described above, are difficult to detect. But with the present system and methods, an image is generated before the return label is applied. Therefore, the label can be superimposed on a flat in the lower right corner of the mailpiece, and as necessary, the images can be verified even with high speed processing, as well as with manual or visual inspection, to ensure that the superimposed label does not cover the original address.

Detail Description Paragraph - DETX (25): [0057] FIG. 5 illustrates the corresponding steps for processing off-line those mailpieces flagged for subsequent processing, according to the procedures described above. These will be images of address indicators for mailpieces which were to be forwarded and the sender notified, but for which no return address was obtained. Initially, the single-scan images generated in earlier processing are again sorted (Block 501) and presented, preferably to a keyboard operator at a video display terminal, each in succession (Block 502). If the image is a repeat of an earlier one presented in the succession of images (Block 503), the operator assigns the preceding return address (Block 504); otherwise the operator attempts to identify on the image a corresponding sender return address indicator, in which case the operator preferably will be able to "point and click" on the indicator (Block 505), as that procedure is understood by those familiar with the relevant art. If the indicator corresponds to a correct sender return address indicator (Block 507), the operator will proceed to the next image if any remain for processing (Block 508). Alternatively, if no correct identification is made, the operator will manually input address information for search using an extraction algorithm (Block 509) against a corresponding list of address indicators, such as the USPS "ZIP+4".

Detail Description Paragraph - DETX (27): [0059] The present invention as illustrated in FIG. 6 achieves the same results in a substantially more efficient manner. In the present invention, a database of images corresponding to current publication cover sheets is maintained. Each mailpiece is processed substantially as described in the earlier procedures (as described below, a specific embodiment provides for an apparatus that permits online processing of bound multiple-page mailpieces such as magazines); that is, an exposed page of each multi-page mailpieces is initially scanned (Block 601). Next, an image indicator is assigned along with an image header (Block 602), and the image number is printed on the exposed page (Block 605), preferably in the lower right corner of the page, and the image and indicator are stored (Block 603). Once each of the plurality of multi-page mailpieces have thus been scanned (Block 604), each stored image is compared with a set of current publication images (Block

606). If a match is made (Block 607), the publisher's address corresponding to the matched database image is placed in the scanned image header (Block 608); otherwise the scanned image is marked for subsequent processing (Block 609).

Detail Description Paragraph - DETX (28): [0060] Once all scanned images have thus been processed (Block 610), the images are sorted (Block 611), preferably by arranging the header in accordance with the image indicator. Those images for which no return address has been identified through an initial match and which have been marked for subsequent processing, are pulled (Block 612) and sorted according to pattern criteria. They are then displayed in succession to an operator, preferably positioned at a keyboard and video display terminal. For each image thus displayed, the operator will provide a shortened extraction code (Block 613) representing the publication name, which is then compared against an existing database of publication names and addresses (Block 614). Because the images have already been sorted according to pattern criteria, the operator can simply use a repeat key for subsequent identically patterned images once a determination has been made. When a match is made (Block 615), the image will be flagged with the corresponding address and put it in the printing buffer. Otherwise, the operator must pull the magazine based on the image number printed on the front, find the publication address (Block 616) and input the address where it will be included in the database of publication names and addresses. The mailpiece then will be included in the printing buffer.

Detail Description Paragraph - DETX (29): [0061] After an address indicator has been determined for each image, a printing procedure commences. Mailpieces are sorted according to the destination address and volume of multiple images. The mailpiece is printed within a "postage due" frame 92 that includes a sender return address indicator and other indicator, preferably a postnet or planet barcode, 94 corresponding to the sender's address (Block 618) (see FIG. 10). Multiple images being sent to the same address will print at the end with a cover sheet indicating the total postage due, the publication address, and any corresponding postnet or planet barcode (Block 619). All the images and corresponding cover sheets are folded and either tabbed or stapled closed before sending to the publisher or other multi-page mailpiece sender. Thus, 3579 processing 600 according to the present invention represents a significant advance over conventional 3579 processing, such as carried out the USPS, in which publisher addresses are continually looked up manually and cover pages are separated and individually placed in envelopes to be addressed to the respective magazine publishers.

Detail Description Paragraph - DETX (30): [0062] Even greater efficiencies are achieved by utilizing the networked destination printing described above in the context of 3547 processing. In the context of 3579 processing, images and address indicators are, again, sized and framed for placement on a notification mailpiece of a predetermined size. The images, also again, can be forwarded to any one of a plurality of printers 800 at remote sites for printing to a label on the corresponding sender notification mailpiece, wherein each destination printer is linked to the system process 16 via a local area network (LAN), the Internet, or any other localized or global communications network.

Detail Description Paragraph - DETX (31): [0063] FIGS. 11-12 illustrate the preferred elements of the system 10 according to the present invention. In addition to the mailpiece feeder 11, mailpiece transporter 20, mailpiece labeler 28, mailpiece stacker 30, and process controller 16 having forwarding address determiner 17, return-to-sender determiner 18, and sender notification determiner 19, the system 10 also includes a reverse side imager 27 to image a sender return address indicator 72 positioned on a reverse side of a mailpiece. As illustrated in greater detail in FIGS. 13-16, the reverse side imager 27 interposes a sender return address indicator 72 image 96 into the single-scan image of the receiver location address indicator 62 and sender notification indicator 74 positioned on the front side of each of the plurality of intermixed mailpieces created by the mailpiece scanner, to thereby create a single data block image comprising receiver location address indicator 62, sender return address indicator 72, and sender notification indicator data 74 (FIG. 14). Preferably, the reverse side imager 27 is a mirror or mirrors positioned along side the mailpiece transporter 20, so as to efficiently reflect a mirror image 96 of a return address indicator 72 positioned on a reverse side a mailpiece. In addition, the process controller 16 preferably includes a reverse image translator 31 to re-orient the reflected mirror images, so that the mirrored image 96 is reversed so that a resulting image 98 corresponds substantially to the return address indicator 72 as it appears positioned on the mailpiece (FIG. 16).

Detail Description Paragraph - DETX (33): [0065] Preferably, the process controller further includes an image storer 34 and an image matcher 35 responsive to the user-supplied data to match stored images to a corresponding mailpiece. The labeler 28 of the system 10 preferably also includes a stored address image labeler 36, the labeler being in communication with the process controller 16 and positioned to label a mailpiece with a stored image of a return address indicator 72. In addition, the labeler 28 includes a stored notice image labeler 37, as well, to label a preselected mailpiece with a stored image of a sender notice 90 (see FIG. 10).

Detail Description Paragraph - DETX (35): [0067] To accommodate margin-bound multi-page mailpieces such as magazines, the mailpiece transporter 20 includes vertical pinch belts 15, each movably mounted on a plurality of mechanically driven rollers 14 and extending substantially parallel to one another along the predetermined path of travel 21, and the feeder 11 preferably includes a vacuum assist device 12 to transport individual mailpieces. Preferably, the speed of the vertical pinch belts is at least 35 inches per second. In addition, the mailpiece scanner preferably is able to scan at least 5,000 mailpieces per hour. To effectively scan or "read" small print borne on a mailpiece, the mailpiece scanner 25 has a resolution of about 250 dots per inch ("dpi") to scan fonts commonly used for preprinted return addresses on mailpieces.

Detail Description Paragraph - DETX (36): [0068] Moreover, to ensure that single-scan images of address indicators can be converted into an image to fit on a label within a predetermined area of a specific size, the process controller preferably includes an image sizer 38 to adjust the size of a sender notice to fit completely and legibly within

the parameters of a 8.5".times.11" mailpiece surface on which appears a sender address indicator 72 while permitting the borders of said mailpiece to be framed with a "postage due" notice 92 (see FIG. 10).

Detail Description Paragraph - DETX (37): [0069] In order to complete a procedure during a single pass of a mailpiece around the path of travel 21, the mailpiece labeler 28 preferably includes a multiline ink jet printer 29 having at least a three-line capability to simultaneously print at least three lines so as to ensure that an address indicator and sender notice to be positioned on a mailpiece, having been scanned and labeled, are printed thereon as the mailpiece is conveyed in a single pass along the predetermined path of travel 21 by the mailpiece transporter 20.

Detail Description Paragraph - DETX (38): [0070] As further illustrated in FIG. 11, the scanner preferably is in communication with a cover sheet imager 39 that can scan an exposed page of a multipage mailpiece, including magazine publications comprising a plurality of pages bound together at the pages' margins, so as to thereby create and store single-scan images of the exposed page of bound multi-page mailpieces. In addition, the process controller 16 preferably includes a multipage mailpiece sender notifier 41 to match the single-scan image of the exposed page of a multipage mailpiece with a corresponding image in a collection of images of exposed pages of preselected multipage mailpieces and to thereby identify a sender address indicator 72 corresponding to the single-scan image. The multipage mailpiece sender notifier 41 is positioned to be responsive to a match made by the multipage mailpiece sender identifier 40, so as to thereby cause the mailpiece labeler 28 to position a sender notification on the exposed page of the corresponding multipage mailpiece.

Detail Description Paragraph - DETX (39): [0071] To effect notification of a sender when a mailpiece is forwarded and to inform the sender of the forwarding address, the process controller preferably includes a forwarding notification generator 42 responsive to a sender notification indicator 74 placed on a mailpiece so as to generate an image of the corresponding location address indicator 62, forwarding address indicator 84, and return address indicator 72, to thereby instruct the mailpiece labeler to label a separate mailpiece with the corresponding image of location address indicator 62, forwarding address indicator 84, and sender return address indicator and generate a sender notification mailpiece 90 to be sent to the sender indicating the forwarding address corresponding to the receiver's location address. The forwarding notification generator 42 preferably includes a postage due report generator 43 to sum the number of mailpieces to be sent to senders indicating the forwarding address corresponding to corresponding receivers' location addresses and computing the total postage due thereon. As already described, the process controller preferably includes an OCR, which, in conjunction with a character comparison algorithm, compares the single-scan image generated by the mailpiece scanner 25 with a preselected set of receiver location address indicators each having a corresponding forwarding address indicator, so as to determine the forwarding address indicator to appear on the system-labeled mailpiece to be forwarded to the address indicated by the forwarding address indicator 90. Consistent with the mail forward procedure described, the process controller 16

preferably includes reason-for-return notification generator 44 responsive to the return-to-sender determiner 18 to instruct the mailpiece labeler 28 to label a mailpiece to be returned to sender with an indicator indicating the reason for the return selected from a list of different reasons for returning the mailpiece to the sender.

Detail Description Paragraph - DETX (40): [0072] FIG. 12 perhaps best illustrates an apparatus according to the present invention for performing each of the above-described mail handling procedures 100, 200, 300, 400, 500, 600, the apparatus preferably including a mailpiece transporter 20, which includes: a mailpiece conveyor 22 to convey each of a plurality of mailpieces along a predetermined path of travel 21; a mailpiece receiver 50 positioned upstream from the mailpiece conveyor 22 at the initial point of the path of travel 21 to receive each mailpiece for subsequent conveyance along the preselected path of travel 21; and a mailpiece dispenser 51 positioned downstream at the terminal point of the path of travel to dispense each mailpiece. The apparatus preferably includes, as well, a scanner 25, preferably an optical character reader to read data positioned on each mailpiece and generate an image of the address data. The apparatus further includes a labeler 28, such as an input-output processor and inkjet printer 29, positioned along the path of travel 21 of the mailpiece transporter 20 downstream from the labeler 28 for labeling each of the plurality of mailpieces with a preselected routing indicator. The apparatus includes a control processor 16, preferably a programmable computer, in communication with the scanner 25 and labeler 28 to receive single-scan images from the scanner 25, separate each image into discrete data groups having at least address indicators 62, 72, 84 and instruct the labeler 28 to label each of the plurality of mailpieces with the preselected routing indicator. The process controller is programmed, preferably using software procedures as well understood in the art and responsive to the location address indication data group, to determine when the receiver address of a corresponding mailpiece corresponds to one of a list of forwarding addresses forming a forwarding address database stored on the processor 16 or on a separate medium in communication with the processor 16 and to instruct the labeler 28 to label the mailpiece with the listed forwarding receiver address 84. The processor similarly is programmed to determine for mailpieces to be returned to a sender the reason why. Accordingly the processor is programmed to instruct the labeler 28 to label the mailpiece with a corresponding sender return address indicator 74 along with a reason for return indicator.

Detail Description Paragraph - DETX (42): [0074] The processor 16 also stores images or is in communication with a medium having a database for storing images of the receiver location address indicators 62, the forward-addressing-means-determined forwarding address indicator 84, and sender return address indicator 72 for subsequent processing and for generating sender notification in mail forwarding procedure 100 and addressing a reason-for-return marked mailpiece. The processor likewise is programmed to produce a postage-due report generator 43 to sum the number of mailpieces to be sent to senders indicating the forwarding address corresponding to corresponding receivers' location addresses and computing the total postage due thereon.

Detail Description Paragraph - DETX (43): [0075] The processor 16 is similarly programmed to compare scanned images of receiver location address indicators 62 for mailpieces not deliverable for some reason with list of addresses stored on the processor or in a database on a separate medium in communication with the processor 16 so as to determine the return. If no corresponding address is found, additional processing is performed, but once having determined why mail is undeliverable at a specific address, the address and corresponding reason will be stored in the database. The processor, in any event, is further programmed to instruct that the labeler label a mailpiece and generate an indicator as to why the mailpiece is being returned, which is applied to the label.

Detail Description Paragraph - DETX (44): [0076] The processor 16 is also programmed to store images or access a database of stored images corresponding to a collection of current periodicals, circulars, and magazines not worth returning to a sender if not delivered but for which a non-delivery notice is desired by the sender. Again, preferably using an optical character reader, the apparatus scans and images an exposed page of a mailpiece having no sender return address indicator positioned thereon, and compares the image with the stored images to determine a sender address indicator 72. The processor 16 is further programmed so that, having made such a determination, the processor instructs the labeler 28 to label a mailpiece and generate an image to be applied to the label bearing a sender return address indicator. Preferably, the processor 16 is programmed to sort the discrete images so as to process seriatim all those images to be sent to the same sender.

Detail Description Paragraph - DETX (45): [0077] FIGS. 1-16 further illustrate the methods of the present invention for carrying out forward mail processing 100, RTS processing 200, second pass RTS processing 300, 3547 processing 400, offline processing 500, and 3579 processing 600. The method aspects of the present invention preferably include generating electronic images of receiver location address indicators and sender return address indicators positioned on each of a plurality of mailpieces. Moreover, the method includes determining a corresponding receiver forwarding address indicator by searching for a match between each receiver location address indicator and a corresponding receiver forwarding address indicator for each mailpiece by making an electronic comparison between the image and a preselected set of corresponding forwarding address indicators. The methods further include searching for the presence of a sender notification indicator positioned on each mailpiece. Also, the method includes generating and positioning a forwarding address indicator on each mailpiece having a match between the receiver location address indicator and the receiver forwarding address indicator. The method further includes generating and storing a sender notification for each of the plurality of mailpieces bearing a sender notification indicator, the sender notification including the receiver location address indicator, receiver forwarding address indicator, and sender return address indicator.

Detail Description Paragraph - DETX (47): [0079] The method aspects corresponding RTS processing include generating electronic images of receiver location address indicators and sender return address indicators positioned on each of a plurality of

mailpieces. The methods further include determining a corresponding receiver forwarding address indicator by searching for a match between each receiver location address indicator and a corresponding receiver forwarding address indicator for each mailpiece by making an electronic comparison between the image and a preselected set of corresponding forwarding address indicators. Moreover, the method includes searching for the presence of a sender notification indicator positioned on each mailpiece. The method also includes generating and positioning a forwarding address indicator on each mailpiece having a match between the receiver location address indicator and the receiver forwarding address indicator, as well as generating and storing a sender notification for each of the plurality of mailpieces having positioned thereon a sender notification indicator, the sender notification including the receiver location address indicator, receiver forwarding address indicator, and sender return address indicator.

Claims Text - CLTX (2): 1. A system for unified mail routing and sender notification of intermixed mailpieces including letters and flat mail, the system comprising: a mailpiece feeder to individually feed a plurality of intermixed mailpieces, each of the plurality of intermixed mailpieces having separate receiver location address indicators, sender return address indicators, and sender notification indicators positioned on each mailpiece; a mailpiece transporter positioned adjacent the mailpiece feeder to receive each of the plurality of mailpieces from the mailpiece feeder and transport each therefrom along a predetermined path of travel; a mailpiece scanner positioned downstream from the mailpiece feeder and adjacent the mailpiece transporter along the path of travel of the plurality of mailpieces to scan the separate receiver location address indicators, sender return address indicators, and sender notification indicators of each of the plurality of intermixed mailpieces to thereby create a single-scan image of address indicators and notification indicator data for each corresponding mailpiece; a mailpiece labeler positioned downstream from the mailpiece scanner and adjacent the mailpiece transporter along the path of travel of the plurality of mailpieces to label each of the plurality of mailpieces with a preselected routing indicator; a process controller in communication with the mailpiece scanner and mailpiece labeler to receive the single-scan image, separate the image into discrete data groups of at least address indicators and notification indicator, instruct the labeler to label each of the plurality of mailpieces with the preselected routing indicator, and generate a sender notice when desired, the process controller comprising: a forwarding address determiner responsive to the receiver location address indication data group of each of the plurality of mailpieces to determine when the receiver address of a corresponding mailpiece corresponds to one of a list of forwarding address indicators and thereby instruct the labeler to label the mailpiece with the corresponding forwarding address indicator, a return-to-sender determiner responsive to the sender return address indication data group of each of the plurality of mailpieces to determine when a corresponding mailpiece is to be returned to sender and thereby instruct the labeler to label the mailpiece with the corresponding return address indicator, and a sender notification determiner responsive to the sender notification indicator data group of each of the plurality of mailpieces to determine when to generate a sender notice; and a mailpiece stacker positioned downstream from the mailpiece transporter to receive each of the

plurality of the intermixed mailpieces from the mailpiece transporter and to direct each of the mailpieces to one of a plurality of preselected stacking positions.

Claims Text - CLTX (3): 2. A system as defined in claim 1 wherein the system further comprises a reverse side imager positioned to image a sender return address indicator located on a second side of each of the plurality of intermixed mailpieces and to interpose the image into the single-scan image of address and notification indicators located on the opposing side of each of the plurality of intermixed mailpieces as created by the mailpiece scanner so as to create a single data image including receiver location address indicator, sender return address indicator, and sender notification indicator data.

Claims Text - CLTX (4): 3. A system as defined in claim 2 wherein the reverse-side imager includes at least one mirror positioned adjacent the mailpiece transporter to thereby reflect mirror images of return address indicators located on the second side of each corresponding mailpiece to the scanner.

Claims Text - CLTX (5): 4. A system as defined in claim 3 wherein the process controller further comprises a reverse image translator responsive to the reverse-side imager to re-orient the reflected mirror images so that the single-scan image corresponds substantially to the return address indicator as it appears positioned on the mailpiece.

Claims Text - CLTX (8): 7. A system as defined in claim 6 wherein the process controller further comprises an image storer for storing images of receiver forwarding address indicators and sender return address indicators.

Claims Text - CLTX (9): 8. A system as defined in claim 7 wherein the mailpiece labeler includes a stored address image labeler responsive to the process controller to label a mailpiece with a stored image of a return address indicator.

Claims Text - CLTX (10): 9. A system as defined in claim 8 wherein the mailpiece labeler further includes a stored notice image labeler responsive to the process controller to label a mailpiece with a stored image of a sender notice.

Claims Text - CLTX (15): 14. A system as defined in claim 1 wherein the mailpiece scanner has a resolution of about 250 dots per inch to scan fonts commonly used for preprinted return addresses on mailpieces.

Claims Text - CLTX (16): 15. A system as defined in claim 1 wherein the process controller further comprises an image sizer to adjust the size of a sender notice to fit completely and legibly within the parameters of a mailpiece surface having a predetermined size and on which is located a sender address indicator along with a postage-due notice.

Claims Text - CLTX (19): 18. A system as defined in claim 17 wherein the process controller further comprises a multipage mailpiece sender identifier to match the single-scan image of the exposed page of a multipage mailpiece with a corresponding image in a collection of images and attributes of exposed pages of preselected multipage mailpieces and to thereby identify a sender address indication corresponding to the single-scan image.

Claims Text - CLTX (21): 20. A system for unified handling and routing of intermixed mailpieces including letters and flat mail, the system comprising: a mailpiece feeder to individually feed a plurality of intermixed mailpieces, each of the plurality of intermixed mailpieces having separate receiver location address indicators and sender return address indicators positioned on each mailpiece; a mailpiece transporter positioned adjacent the mailpiece feeder to receive each of the plurality of mailpieces from the mailpiece feeder and transport each therefrom along a predetermined path of travel; a mailpiece scanner positioned downstream from the mailpiece feeder and adjacent the mailpiece transporter along the path of travel of the plurality of mailpieces to scan the separate receiver location address indicators and sender return address indicator of each of the plurality of intermixed mailpieces to thereby create a single-scan image of address indicators data for each corresponding mailpiece; a mailpiece labeler positioned downstream from the mailpiece scanner and adjacent the mailpiece transporter along the path of travel of the plurality mailpieces to label each of the plurality of mailpieces with a preselected routing indicator; a process controller in communication with the mailpiece scanner and mailpiece labeler to receive the single-scan image, separate the image into discrete data groups and instruct the labeler to label each of the plurality of mailpieces with the preselected routing indicator, the process controller comprising: a forwarding address determiner responsive to the receiver location address indication data group of each of the plurality of mailpieces to determine when the receiver address of a corresponding mailpiece matches one of a list of receiver forwarding address indicators and thereby instruct the labeler to label the mailpiece with the corresponding receiver forwarding address indicator, a return-to-sender determiner responsive to the sender return address indication data group of each of the plurality of mailpieces to determine when a corresponding mailpiece is to be returned to sender and thereby instruct the labeler to label the mailpiece with the corresponding return address indicator.

Claims Text - CLTX (22): 21. A system as defined in claim 20 wherein the process controller further comprises a forwarding notification generator responsive to a sender notification indicator positioned on a mailpiece to generate an image of the corresponding location address indicator, forwarding address indicator and return address indicator and instruct the mailpiece labeler to label a separate mailpiece with the corresponding image of location address indicator, forwarding address indicator, and sender return address indicator so as to generate a mailpiece to be sent to the sender indicating the forwarding address corresponding to the receiver location address.

Claims Text - CLTX (26): 25. A system as defined in claim 24 wherein the process controller includes an optical character reader to compare the single-scan image with a

preselected set of receiver location address indicators each having a corresponding forwarding address indicator so as to determine the forwarding address indicator to appear on the system-labeled mailpiece to be forwarded to the address indicated by the forwarding address indicator.

Claims Text - CLTX (29): 28. A system as defined in claim 27 wherein the system further comprises a reverse side imager to image a sender return address indicator positioned on a second side of each of the plurality of intermixed mailpieces and to interpose the image into the single-scan image of address and notification indicators positioned on the opposing side of each of the plurality of intermixed mailpieces as created by the mailpiece scanner so as to create a single data block image comprising receiver location address indicator, sender return address indicator, and sender notification indicator data.

Claims Text - CLTX (30): 29. A system as defined in claim 28 wherein the reverse side imager is a mirror positioned adjacent the mailpiece transporter to thereby reflect mirror images of return address indicators positioned on the second side of each corresponding mailpiece to the scanner.

Claims Text - CLTX (31): 30. A system as defined in claim 29 wherein the process controller further comprises a reverse image translator to re-orient the reflected mirror images so that the single-scan image corresponds substantially to the return address indicator as it appears positioned on the mailpiece.

Claims Text - CLTX (32): 31. An system for unified mail routing and sender notification of a plurality of mailpieces including letters and flat mail, the system comprising: a mailpiece transporter comprising: a mailpiece conveyor to convey each of the plurality of mailpieces along a predetermined path of travel, a mailpiece receiver positioned upstream from the mailpiece conveyor and downstream from the mailpiece feeder at the initial point of the path of travel from the mailpiece feeder to receive each mailpiece for subsequent conveyance along a preselected path of travel, and a mailpiece dispenser positioned downstream at the terminal point of the path of travel to dispense each mailpiece; imaging means positioned adjacent the mailpiece transporter and comprising receiver location address indicator imaging means and sender return address indicator imaging means for generating single-scan electronic images of receiver location address and sender return address indicators positioned on each mailpiece; labeling means positioned adjacent the mailpiece transporter downstream from said imaging means along the preselected path of travel for labeling each of the plurality of mailpieces with a preselected routing indicator; and processing means in communication with the imaging and labeling means for receiving the single-scan images, separating each image into discrete data groups of at least address indicators, and instructing the labeling means to label each of the plurality of mailpieces with the preselected routing indicator, the processing means comprising: forward addressing means responsive to the location address indication data group of each of the plurality of mailpieces for determining when the receiver address of a corresponding mailpiece corresponds to one of a list of forwarding addresses and thereby instructing the labeling

means to label the mailpiece with the listed forwarding receiver address; and return-to-sender addressing means responsive to the address indication data group of each of the plurality of mailpieces to determine when a corresponding mailpiece is to be returned to sender and thereby instructing the labeling means to label the mailpiece with a corresponding sender return address.

Claims Text - CLTX (35): 34. An system as defined in claim 33 wherein the processing means further comprises sender notification indicating means responsive to sender notification indicators positioned on a mailpiece for identifying a sender notification request requesting that the corresponding sender of a mailpiece be notified when the mailpiece is forwarded to an address different from that of the receiver location address indicator, generating and saving an image comprising the receiver location address indicator, the forward-addressing-means-determined forwarding address indicator, and sender return address indicator.

Claims Text - CLTX (36): 35. An system as defined in claim 34 further comprising sender notification generating means responsive to the sender notification indicating means for positioning the image generated by the sender notification generating means to a separate mailpiece for subsequent notification to the sender that the corresponding mailpiece is to be forwarded to the forwarding address indicator.

Claims Text - CLTX (37): 36. An system as defined in claim 35 further comprising image sizing means for adjusting the dimensions of the images generated by the sender notification indicating means so as to fit within preselected dimensions of a mailpiece having a preselected size.

Claims Text - CLTX (41): 40. An system defined in claim 39 wherein the system further comprises reverse side imaging means for imaging a sender return address indicator positioned on a second side of each of the plurality of intermixed mailpieces and to interpose the image into the single-scan image of address and notification indicators positioned on the opposing side of each of the plurality of intermixed mailpieces as created by the mailpiece scanner so as to create a single data block image comprising receiver location address indicator, sender return address indicator, and sender notification indicator data.

Claims Text - CLTX (42): 41. An system as defined in claim 40 wherein the reverse side imaging means includes mirroring means positioned adjacent the mailpiece transporter for reflecting mirror images of return address indicators positioned on the second side of each corresponding mailpiece to the mailpiece scanning means.

Claims Text - CLTX (43): 42. An system as defined in claim 41 wherein the processing means further comprises reverse image translating means for re-orienting the reflected mirror images so that the single-scan images correspond substantially to the return address indicators as each appears positioned on the mailpiece.

Claims Text - CLTX (45): 44. An system as defined in claim 43 wherein the no-forwarding processing means further comprises exposed page imaging and labeling means for imaging the exposed page of a mailpiece having no sender return address indicator positioned thereon, labeling the image and storing the labeled image.

Claims Text - CLTX (46): 45. An system as defined in claim 44 wherein the no-forwarding processing means further comprises stored image comparison means for comparing each labeled image stored with a set of preselected images, each preselected image having a corresponding return address indicator, to thereby identify a match between the stored image and one of the preselected images and to instruct the mailpiece labeling means to label a separate mailpiece with the corresponding return address indicator.

Claims Text - CLTX (49): 48. A method for unified forwarding of mail and notifying sender, the method comprising the steps of: generating electronic images of receiver location address indicators and sender return address indicators positioned on each of a plurality of mailpieces; determining a corresponding receiver forwarding address indicator by searching for a match between each receiver location address indicator and a corresponding receiver forwarding address indicator for each mailpiece by making an electronic comparison between the generated electronic image and a preselected set of corresponding forwarding address indicators; searching for the presence of a sender notification indicator positioned on each mailpiece; generating a forwarding address indicator on each mailpiece having a match between the receiver location address indicator and the receiver forwarding address indicator; and generating and storing a sender notification for each of the plurality of mailpieces having positioned thereon a sender notification indicator, the sender notification including the receiver location address indicator, receiver forwarding address indicator, and sender return address indicator.

Claims Text - CLTX (53): 52. A method for unified forwarding of mail and notifying sender, the method comprising the steps of: electronically scanning a plurality of mailpieces and generating a corresponding single-scan image of receiver location address indicator and sender return address indicators; searching for a match between each receiver location address indicator and a corresponding receiver forwarding address indicator from among a set of preselected receiver forwarding address indicators; and labeling each mailpiece for which a match is found between the receiver location address indicator and one said preselected receiver forwarding address indicator with a label formed by interposing the receiver forwarding address indicator onto the single-scan image.

Claims Text - CLTX (55): 54. A method of routing mail to be returned to sender and notifying sender of the reason for return, the method comprising the steps of: scanning each of a plurality of mailpieces having receiver address location indicators and sender return address location indicators positioned thereon to generate a single-scan image of the address indicators data; separating the receiver location address indicator data; electronically comparing the address indicator characters with a preselected list to

determine a match from a preselected set of return indicators, each return indicator having an indicator of the reason the corresponding mailpiece was not deliverable; and generating a corresponding a label positioned on a mailpiece and comprising the receiver location address indicator, the sender return address indicator, and corresponding indicator of the reason the mailpiece was not deliverable.

US-PAT-NO: 6401936
DOCUMENT-IDENTIFIER: US 6401936 B1
TITLE: Divert apparatus for conveyor system
DATE-ISSUED: June 11, 2002
INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Isaacs; Gerald A.	Arlington	TX	N/A	N/A
Pippin; James M.	Keller	TX	N/A	N/A
Kugle; Stephen T.	late of Arlington	TX	N/A	N/A
Mondie; George M.	Bedford	TX	N/A	N/A
Neff; M. Wayne	Dallas	TX	N/A	N/A

US-CL-CURRENT: 209/656, 198/367.1 , 198/531

ABSTRACT: In one embodiment, an article sorting system includes successive coarse and fine singulators and a recirculating loop for processing a disordered stream of items including three-dimensional non-flat articles. A coarse singulator includes cascaded ramped conveyors, preferably operating at progressively greater speeds. A detection system, such as a vision system, for monitoring the stream of articles and identifying and/or tracking individual items passing through the system is used in conjunction with a fine singulator such as a chevron, hold-and-release or strip conveyor downstream from the coarse singulator. A control system is utilized in connection with the vision system to regulate the flow of articles through the system by, for example, diverting doubles or clusters for separations. A method of sorting articles includes steps of singulating a disordered stream of items with multiple singulating steps including a coarse singulating step for mechanically increasing the spacing between items in the stream, and a fine singulating step in which individual items are monitored and/or identified and tracked as they traverse the system. A divert apparatus which can be provided for diverting oversize/overweight articles or unwanted clusters of unsingulated articles includes an angled roller conveyor and a gate for discharging articles from the stream of articles to be processed.
11 Claims, 22 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 11

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Brief Summary Text - BSTX (4): In high volume product handling operations, such as mail handling and similar processing, large quantities of items such as boxes, parcels packages or parts often varying widely in size, must be inducted into a sorter systems. Typically, a feeder system for use in such processing areas takes a disordered stream of items fed to it on a conveyor and inducts the items onto a sorter system. The feeder system ideally should perform several functions. To the maximum extent possible, the feeder should singulate disordered items in order to present the articles to downstream processing equipment, such as a sorter, one at a time with a minimum specified spacing or separation between product items. The feeder system must also read destination information from the item so that the control system for the sort can track it through the

system and sort it correctly. In the U.S., scannable bar codes are used for this purpose. A third important function is intercepting and removing items which are non-machinable because they are too large, too heavy or the like from the system for special handling.

Brief Summary Text - BSTX (9): In accordance with one aspect of the invention, a system for feeding items to a sorter includes a first conveyor that conveys a stream of items to be sorted, a mechanical singulator that receives the stream of items from the conveyor and singulates the items, an automated system for detection and removal from the stream items which exceed predetermined physical limitations associated with the sorter, a scanner for reading destination indicia on each item, a second conveyor for conveying each item for induction to the sorter, and optionally a labeler that labels each item with a label readable by the sorter, which label identifies a sorting destination that corresponds to the read destination indicia.

Brief Summary Text - BSTX (11): An article sorting method for feeding items to a sorter according to the invention comprises the steps of conveying a stream of items such as mail pieces on a conveyor to an automated singulator, singulating the items using the singulator, detecting and removing from the stream items which exceed predetermined physical limitations associated with the sorter, reading destination indicia on each item, and conveying each item for induction to the sorter for sorting in accordance with the read destination indicia. Each item may further be labeled with a label readable by the sorter, which label identifies a sorting destination that corresponds to the read destination indicia.

Detailed Description Text - DETX (2): FIG. 1 illustrates a feeder/reader subsystem 18 according to the invention. A continuous flow of material such as parcels is diverted onto a short belt buffer conveyor 20 (single or double) from a parcel belt feed conveyor 19 by means of a right angle transfer mechanism 16, e.g., a set of angled power rollers with a movable gate. Typically, the material is a disordered stream of non-flat, three-dimensional articles that may include overweight articles, oversize articles and clusters of articles that must be separated prior to processing.

Detailed Description Text - DETX (3): An acceleration or infeed conveyor 21 controls the velocity of the product flow into a singulator module 33. Acceleration conveyor 21 may include an inspection camera and a control system that monitors the items entering conveyor 21. As used herein, the term "density" with reference to a stream of articles such as mail pieces refers to the number of articles present in a given area, such as a segment of a conveyor, at a point in time. Items in single file with controlled spacing, which leave chevron singulator module 33 on a transport conveyor 34, are edged on edging conveyor 29 and are subject to bar code scanning in a scanning module 35. Integral with the bar code scanning module 35 is a measure and weigh module 36.

Detailed Description Text - DETX (7): Items which have then been identified, either by multi-sided bar code scanning, scanning up to six sides, the parcel address reader 39, or by radio identification (RIDF) patches or tags attached to each item are sent through a

series of buffer conveyors 40 directly to a labeler 41. Pieces that cannot be identified either by multi-sided bar code scanning or the parcel address reader are diverted by a divert conveyor section 42 through a series of buffer conveyors 43 to a manual station 44, at which the required information (i.e. address) is read and keyed in by a human operator. Following such manual entry, the item is sent back along a further series of buffer conveyors 46 to a merge section 47, at which point the diverted piece rejoins the main stream and the destination of the item is physically affixed by equipment such as label applicator 41. Thus, following identification by one of the three means described, each item is labeled with destination information on its top face by labeler 41 before induction onto a sorter such as a tilt tray sorter (not shown). The transfer of an item onto a sorter, such as a tilt tray sorter, is carried out in a manner known in the art.

Detailed Description Text - DETX (10): In one embodiment, the vision system monitor the number and/or size of items or articles present on the input third, 21A, middle third 21B and output third 21C of acceleration conveyor 21. Controller 13 uses this information to control the flow of articles. The number of items present on the input third 21A is used to control the speed of the conveyor or conveyors feeding the acceleration conveyor 21. It the number of articles on input third 21A is too great, the speed of the conveyor or conveyors feeding the acceleration conveyor, for example, conveyors 19 and 20, is slowed. If the number of articles is below the desired number, the speed of the conveyors feeding the acceleration conveyors is increased.

Detailed Description Text - DETX (11): The quantity of articles in the middle third 21B of acceleration conveyor 21 is monitored to insure that the number of articles being transported to the chevron singulator is within the desired range. If the number of articles exceeds the desired number, the controller 13 slows down the conveyors feeding the acceleration conveyor, overriding any speed-up requirement or command based upon the number of articles present on the input third 21A of the acceleration conveyor 21. If the number of articles is below the desired level in the middle third 21B, no command is issued as the number of articles present on the input third 21A of the conveyor is used to control the maximum speed, e.g. maximum number of articles received from the conveyors feeding the acceleration conveyor.

Detailed Description Text - DETX (13): In one embodiment, camera or cameras 11 record images containing, for example, 1,000,000 pixels in a 1024.times.1024 format. The images are transferred to control system 13 where the images are interpreted to determine the number of packages and the average size of the packages. The control system can utilize this information to regulate the speed of the parcel feeder conveyor 19, buffer conveyor 20, acceleration conveyor 21, singulator 33 and transport conveyor 34.

Detailed Description Text - DETX (14): Singulator 33 comprises a chevron configuration of powered rollers that may be driven in unison but are preferably controllable individually or in groups as described hereafter. The rollers of each half of singulator 33 are angled inwardly so that the items entering the singulator 33 from the conveyor 21 move towards the middle of the singulator as the parcels are transported,

effectively assuming a single file formation. Transport conveyor 34 receives the items in single file order and can be used to increase the spacing between each item if operated at a transfer speed greater than the singulator 33. The control system can be used to slow down conveyor 21 if the formation of items on it is dense, giving a greater delay between items as each item enters singulator 33, or to speed up conveyor 21 if the formation of items is sparse, so that overall throughput of the system can be increased without affecting singulation. Transport conveyor 34 deposits singulated, spaced items onto edging conveyor 29. Edging conveyor 29 comprises a series of live rollers mounted in an angled pattern. Edging conveyor 29 "edges" items on the conveyor before the items enter scanning tunnel 35, Edging conveyor 29 may also be utilized as a multiples detection zone. If acceleration conveyor 21 and singulator 33 have failed to provide adequate spacing or separation between any two articles, the items may be electronically flagged for downstream diversion.

Detailed Description Text - DETX (16): Referring to FIG. 2, a singulation and recirculation system or loop 50 includes an acceleration conveyor 52, a chevron conveyor 54, a spacing conveyor 56, a doubles detection conveyor 59, an edging divert conveyor 58, a series of cascaded recirculation conveyors 102-105, and a buffer conveyor 62. The acceleration conveyor 52 may be fed by a slide 55 including a central divider 57 with diverging walls that spread out the congested stream of items. Acceleration of the item stream delivered by buffer conveyor 62 tends to further spread out the formation. Acceleration conveyor 52 may comprise a standard or variable speed conveyor. Singulation loop 50 may be provided with a vision system including a camera 60A mounted over acceleration conveyor 52 for monitoring the density of items 64, with controls for slowing down or speeding up the conveyor 52 as needed.

Detailed Description Text - DETX (22): As noted above, the formation of a singulated stream of items occurs as a result of the V-shaped or chevron geometry of the rollers 66 in connection with the direction of rotation as indicated by arrow 100 (FIG. 7B). As illustrated by arrow 100, the rollers 66 of each half of the chevron conveyor turn toward the centerline of the conveyor 54. The formation of a singulated stream occurs even when the chevron conveyor is operating without the benefit of computer control over the speed of the rollers 66 or the rate at which packages are fed onto the chevron conveyor 54 by acceleration conveyor 52. However, according to a preferred aspect of the invention, vision system 61 and controller 65 can be used to further enhance the ability of the chevron conveyor 54 to singulate a stream of packages.

Detailed Description Text - DETX (23): Controller 65, (FIG. 3) which may be a programmable logic controller (PLC), is set to a predetermined target spacing between packages. Vision system 61 and camera 60B return images of packages 64 on the chevron conveyor 54, and the position of each such package is computed. The projected path of each package on chevron conveyor 54 may then be estimated based on the current speeds of the roller groups 76 along such path. Where a collision or inadequate spacing is predicted, controller 65 slows or stops rollers in the path of the one of the packages while the other goes through. If packages 64 are being introduced on the chevron conveyor 54 too fast for the system to singulate, then controller 65 sends a

feedback signal to the acceleration conveyor 52, slowing or stopping the introduction of new packages 64 onto the chevron conveyor 54 until the number of packages on chevron conveyor 54 reaches a predetermined normal level.

Detailed Description Text - DETX (32): Diverted items 64 may be those which are detected as "doubles" or "multiples," namely two or more items overlapping or too close together. For this purpose doubles detection conveyor 59 may be placed immediately upstream from edging conveyor 58' as shown in FIG. 2 and receives items 64 from spacing conveyor 56. Eliminating doubles and multiples, e.g. clusters of two or more items that are side by side or consecutive without sufficient spacing, is a key element of bulk item handling automation. A method for detection of doubles according to the present invention involves capturing top and profile images of items 64 while in motion on conveyor 59, evaluating the images using a simple algorithm to test for doubles, and comparing images against a database to determine destination, i.e., whether or not the items imaged will be passed on or diverted off of the feeder line. Preferably, conveyor 59 according to the invention is a powered roller conveyor with variable speed capability. A vision system 106, which may be part of system 61 or self-contained, includes two or more digital cameras 111 that acquire images from above the conveyor and from the sides.

Detailed Description Text - DETX (33): As an alternative to using three, or multiple cameras 111, a single, upwardly directed camera 111 with zoom capability is shown in FIGS. 13A-13C. A tiltable mirror 112 cooperates with angled mirrors 113 on either side of the conveyor to record images from the top and both sides. It has been found further that greater doubles detection accuracy results from imaging the upper surface of the doubles detect conveyor at a substantial distance, e.g. 20 feet or more, to reduce parallax errors. Parallax errors can also be reduced by using multiple mirrors and/or curved mirrors.

Detailed Description Text - DETX (35): Other useful vision systems include a line scan system wherein the camera position at a gap between two conveyors creates a scrolling image of objects that pass by. Such a system is further described in commonly-assigned U.S. Ser. No. 09/540,371, filed Mar. 31, 2000, the entire contents of which is incorporated by reference herein for all purposes. This patent application also describes, for example, several alternative hold and release mechanism which could be used as the fine singulator of the present invention.

Detailed Description Text - DETX (40): FIGS. 11 and 12 illustrate an alternative form of cascaded conveyor system wherein a first, essentially horizontal conveyor 102' feeds to a series of inclined conveyors 103', 104' that form an upward ramp. The crossovers from one inclined conveyor to another help segregate items that are lined up in the lengthwise (conveying) direction. In one embodiment, inclined conveyors 103', 104' each include a plurality of parallel longitudinal conveying sections comprising parallel strip belts 120. The belts 120 of the ramped conveyors 103', 104' are controlled individually so that some parcels or items are moving upwards on active belts 121 while others remain stationary on idle belts 122. Belts 120 can be controlled by a vision and

control system 123 as described herein that identifies the lead parcel for each section and the belts which support items, running those while others remain idle. The vision and control system 123 may also be used to detect doubles and operate selected belts 120 to separate clustered items.

Detailed Description Text - DETX (42): When used as part of a feeder/reader subsystem as shown in FIGS. 1A, 1B, the foregoing recirculation loop would be positioned as indicated to replace singulator 33 and conveyor 34. In this connection, it should be noted that the edging divert module 37 following the scanning tunnel 35 or alternatively, an RFID station, may have essentially the same construction as the edging divert conveyor 58', but is controlled differently, namely to divert objects which prove to be non-machinable based on weight and/or size as measured in tunnel 35. In the alternative, an arrangement could be employed wherein the scanning tunnel 35 receives mail pieces 64 directly from the doubles detection conveyor 59, and the edging divert conveyor 58' is located immediately downstream from scanning tunnel 35.

US-PAT-NO: 6435404
DOCUMENT-IDENTIFIER: US 6435404 B1
TITLE: Return mailer
DATE-ISSUED: August 20, 2002
INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Feick; William Kurt	New Canaan	CT	06840	N/A

US-CL-CURRENT: 229/303, 229/71 , 229/72

ABSTRACT: A reusable mailer is provided whereby the mailer includes a front panel, back panel, and flap having a plurality of separable panels, whereby each panel is capable of closing and opening the mailer. The mailer may also include transparent sleeves for viewing an insertable card having mailing indicia thereon. The transparent sleeves may also have masking in order to desirably display selected portions of the card. The masking may further have indicia provided thereon to further facilitate mailing the mailer to and from a recipient.
18 Claims, 6 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 6

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Brief Summary Text - BSTX (26): In yet another embodiment, the cards may have electronically scannable identifying information printed thereon so that, upon being scanned, one can determine who the sender or recipient is and who is paying for postage and in what manner. Other information may also be provided, such as the destination address and whether or not a return mailing has been authorized. The scannable identifying information may comprise a bar code or other known scannable information and may be scanned by known scanning devices.

Detailed Description Text - DETX (37): Furthermore, a sender may set a finite time limit for a recipient to use return mailer 10. Subsequent to the time limit's expiration, the delivery personnel, upon scanning, would be notified that mailer 10 is not to be reused and that the sender has not authorized postage payment for return mailer 10. In this effort, a sender can control postage costs.

US-PAT-NO: 6484886
DOCUMENT-IDENTIFIER: US 6484886 B1
TITLE: Feeder reader subsystem
DATE-ISSUED: November 26, 2002
INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Isaacs; Gerald A.	Arlington	TX	N/A	N/A
Pippin; James M.	Keller	TX	N/A	N/A
Kugle; Stephen T.	late of Arlington	TX	N/A	N/A
Mondie; George M.	Bedford	TX	N/A	N/A
Neff; M. Wayne	Dallas	TX	N/A	N/A

US-CL-CURRENT: 209/539, 198/368 , 198/457.02 , 209/583 , 209/586 , 209/592 , 209/656 , 209/918

ABSTRACT: In one embodiment, an article sorting system includes successive coarse and fine singulators and a recirculating loop for processing a disordered stream of items including three-dimensional non-flat articles. A coarse singulator includes cascaded ramped conveyors, preferably operating at progressively greater speeds. A detection system, such as a vision system, for monitoring the stream of articles and identifying and/or tracking individual items passing through the system is used in conjunction with a fine singulator such as a chevron, hold-and-release or strip conveyor downstream from the coarse singulator. A control system is utilized in connection with the vision system to regulate the flow of articles through the system by, for example, diverting doubles or clusters for separations. A method of sorting articles includes steps of singulating a disordered stream of items with multiple singulating steps including a coarse singulating step for mechanically increasing the spacing between items in the stream, and a fine singulating step in which individual items are monitored and/or identified and tracked as they traverse the system. A divert apparatus which can be provided for diverting oversize/overweight articles or unwanted clusters of unsingulated articles includes an angled roller conveyor and a gate for discharging articles from the stream of articles to be processed.
18 Claims, 22 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 11

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Brief Summary Text - BSTX (4): In high volume product handling operations, such as mail handling and similar processing, large quantities of items such as boxes, parcels packages or parts often varying widely in size, must be inducted into a sorter systems. Typically, a feeder system for use in such processing areas takes a disordered stream of items fed to it on a conveyor and inducts the items onto a sorter system. The feeder system ideally should perform several functions. To the maximum extent possible, the feeder should singulate disordered items in order to present the articles to downstream processing equipment, such as a sorter, one at a time with a minimum specified spacing or separation between product items. The feeder system must also read destination

information from the item so that the control system for the sort can track it through the system and sort it correctly. In the U.S., scannable bar codes are used for this purpose. A third important function is intercepting and removing items which are non-machinable because they are too large, too heavy or the like from the system for special handling.

Brief Summary Text - BSTX (9): In accordance with one aspect of the invention, a system for feeding items to a sorter includes a first conveyor that conveys a stream of items to be sorted, a mechanical singulator that receives the stream of items from the conveyor and singulates the items, an automated system for detection and removal from the stream items which exceed predetermined physical limitations associated with the sorter, a scanner for reading destination indicia on each item, a second conveyor for conveying each item for induction to the sorter, and optionally a labeler that labels each item with a label readable by the sorter, which label identifies a sorting destination that corresponds to the read destination indicia.

Brief Summary Text - BSTX (11): An article sorting method for feeding items to a sorter according to the invention comprises the steps of conveying a stream of items such as mail pieces on a conveyor to an automated singulator, singulating the items using the singulator, detecting and removing from the stream items which exceed predetermined physical limitations associated with the sorter, reading destination indicia on each item, and conveying each item for induction to the sorter for sorting in accordance with the read destination indicia. Each item may further be labeled with a label readable by the sorter, which label identifies a sorting destination that corresponds to the read destination indicia.

Detailed Description Text - DETX (2): FIG. 1 illustrates a feeder/reader subsystem 18 according to the invention. A continuous flow of material such as parcels is diverted onto a short belt buffer conveyor 20 (single or double) from a parcel belt feed conveyor 19 by means of a right angle transfer mechanism 16, e.g., a set of angled power rollers with a movable gate. Typically, the material is a disordered stream of non-flat, three-dimensional articles that may include overweight articles, oversize articles and clusters of articles that must be separated prior to processing.

Detailed Description Text - DETX (3): An acceleration or infeed conveyor 21 controls the velocity of the product flow into a singulator module 33. Acceleration conveyor 21 may include an inspection camera and a control system that monitors the items entering conveyor 21. As used herein, the term "density" with reference to a stream of articles such as mail pieces refers to the number of articles present in a given area, such as a segment of a conveyor, at a point in time. Items in single file with controlled spacing, which leave chevron singulator module 33 on a transport conveyor 34, are edged on edging conveyor 29 and are subject to bar code scanning in a scanning module 35. Integral with the bar code scanning module 35 is a measure and weigh module 36.

Detailed Description Text - DETX (6): Items which have then been identified, either by multi-sided bar code scanning, scanning up to six sides, the parcel address reader 39, or

by radio identification (RIDF) patches or tags attached to each item are sent through a series of buffer conveyors 40 directly to a labeler 41. Pieces that cannot be identified either by multi-sided bar code scanning or the parcel address reader are diverted by a divert conveyor section 42 through a series of buffer conveyors 43 to a manual station 44, at which the required information (i.e. address) is read and keyed in by a human operator. Following such manual entry, the item is sent back along a further series of buffer conveyors 46 to a merge section 47, at which point the diverted piece rejoins the main stream and the destination of the item is physically affixed by equipment such as label applicator 41. Thus, following identification by one of the three means described, each item is labeled with destination information on its top face by labeler 41 before induction onto a sorter such as a tilt tray sorter (not shown). The transfer of an item onto a sorter, such as a tilt tray sorter, is carried out in a manner known in the art.

Detailed Description Text - DETX (9): In one embodiment, the vision system monitor the number and/or size of items or articles present on the input third, 21A, middle third 21B and output third 21C of acceleration conveyor 21. Controller 13 uses this information to control the flow of articles. The number of items present on the input third 21A is used to control the speed of the conveyor or conveyors feeding the acceleration conveyor 21. It the number of articles on input third 21A is too great, the speed of the conveyor or conveyors feeding the acceleration conveyor, for example, conveyors 19 and 20, is slowed. If the number of articles is below the desired number, the speed of the conveyors feeding the acceleration conveyors is increased.

Detailed Description Text - DETX (10): The quantity of articles in the middle third 21B of acceleration conveyor 21 is monitored to insure that the number of articles being transported to the chevron singulator is within the desired range. If the number of articles exceeds the desired number, the controller 13 slows down the conveyors feeding the acceleration conveyor, overriding any speed-up requirement or command based upon the number of articles present on the input third 21A of the acceleration conveyor 21. If the number of articles is below the desired level in the middle third 21 B, no command is issued as the number of articles present on the input third 21A of the conveyor is used to control the maximum speed, e.g. maximum number of articles received from the conveyors feeding the acceleration conveyor.

Detailed Description Text - DETX (12): In one embodiment, camera or cameras 11 record images containing, for example, 1,000,000 pixels in a 1024.times.1024 format. The images are transferred to control system 13 where the images are interpreted to determine the number of packages and the average size of the packages. The control system can utilize this information to regulate the speed of the parcel feeder conveyor 19, buffer conveyor 20, acceleration conveyor 21, singulator 33 and transport conveyor 34.

Detailed Description Text - DETX (13): Singulator 33 comprises a chevron configuration of powered rollers that may be driven in unison but are preferably controllable individually or in groups as described hereafter. The rollers of each half of singulator 33 are angled inwardly so that the items entering the singulator 33 from the

conveyor 21 move towards the middle of the singulator as the parcels are transported, effectively assuming a single file formation. Transport conveyor 34 receives the items in single file order and can be used to increase the spacing between each item if operated at a transfer speed greater than the singulator 33. The control system can be used to slow down conveyor 21 if the formation of items on it is dense, giving a greater delay between items as each item enters singulator 33, or to speed up conveyor 21 if the formation of items is sparse, so that overall throughput of the system can be increased without affecting singulation. Transport conveyor 34 deposits singulated, spaced items onto edging conveyor 29. Edging conveyor 29 comprises a series of live rollers mounted in an angled pattern. Edging conveyor 29 "edges" items on the conveyor before the items enter scanning tunnel 35. Edging conveyor 29 may also be utilized as a multiples detection zone. If acceleration conveyor 21 and singulator 33 have failed to provide adequate spacing or separation between any two articles, the items may be electronically flagged for downstream diversion.

Detailed Description Text - DETX (15): Referring to FIG. 2, a singulation and recirculation system or loop 50 includes an acceleration conveyor 52, a chevron conveyor 54, a spacing conveyor 56, a doubles detection conveyor 59, an edging divert conveyor 58, a series of cascaded recirculation conveyors 102-105, and a buffer conveyor 62. The acceleration conveyor 52 may be fed by a slide 55 including a central divider 57 with diverging walls that spread out the congested stream of items. Acceleration of the item stream delivered by buffer conveyor 62 tends to further spread out the formation. Acceleration conveyor 52 may comprise a standard or variable speed conveyor. Singulation loop 50 may be provided with a vision system including a camera 60A mounted over acceleration conveyor 52 for monitoring the density of items 64, with controls for slowing down or speeding up the conveyor 52 as needed.

Detailed Description Text - DETX (21): As noted above, the formation of a singulated stream of items occurs as a result of the V-shaped or chevron geometry of the rollers 66 in connection with the direction of rotation as indicated by arrow 100 (FIG. 7B). As illustrated by arrow 100, the rollers 66 of each half of the chevron conveyor turn toward the centerline of the conveyor 54. The formation of a singulated stream occurs even when the chevron conveyor is operating without the benefit of computer control over the speed of the rollers 66 or the rate at which packages are fed onto the chevron conveyor 54 by acceleration conveyor 52. However, according to a preferred aspect of the invention, vision system 61 and controller 65 can be used to further enhance the ability of the chevron conveyor 54 to singulate a stream of packages.

Detailed Description Text - DETX (22): Controller 65, (FIG. 3) which may be a programmable logic controller (PLC), is set to a predetermined target spacing between packages. Vision system 61 and camera 60B return images of packages 64 on the chevron conveyor 54, and the position of each such package is computed. The projected path of each package on chevron conveyor 54 may then be estimated based on the current speeds of the roller groups 76 along such path. Where a collision or inadequate spacing is predicted, controller 65 slows or stops rollers in the path of the one of the packages while the other goes through. If packages 64 are being introduced on the

chevron conveyor 54 too fast for the system to singulate, then controller 65 sends a feedback signal to the acceleration conveyor 52, slowing or stopping the introduction of new packages 64 onto the chevron conveyor 54 until the number of packages on chevron conveyor 54 reaches a predetermined normal level.

Detailed Description Text - DETX (31): Diverted items 64 may be those which are detected as "doubles" or "multiples," namely two or more items overlapping or too close together. For this purpose doubles detection conveyor 59 may be placed immediately upstream from edging conveyor 58' as shown in FIG. 2 and receives items 64 from spacing conveyor 56. Eliminating doubles and multiples, e.g. clusters of two or more items that are side by side or consecutive without sufficient spacing, is a key element of bulk item handling automation. A method for detection of doubles according to the present invention involves capturing top and profile images of items 64 while in motion on conveyor 59, evaluating the images using a simple algorithm to test for doubles, and comparing images against a database to determine destination, i.e., whether or not the items imaged will be passed on or diverted off of the feeder line. Preferably, conveyor 59 according to the invention is a powered roller conveyor with variable speed capability. A vision system 106, which may be part of system 61 or self-contained, includes two or more digital cameras 111 that acquire images from above the conveyor and from the sides.

Detailed Description Text - DETX (32): As an alternative to using three, or multiple cameras a single, upwardly directed camera 111 with zoom capability is shown in FIGS. 13A-13C. A tiltable mirror 112 cooperates with angled mirrors on either side of the conveyor to record images from the top and both sides. It has been found further that greater doubles detection accuracy results from imaging the upper surface of the doubles detect conveyor at a substantial distance, e.g. 20 feet or more, to reduce parallax errors. Parallax errors can also be reduced by using multiple mirrors and/or curved mirrors.

Detailed Description Text - DETX (34): Other useful vision systems include a line scan system wherein the camera position at a gap between two conveyors creates a scrolling image of objects that pass by. Such a system is further described in commonly-assigned U.S. Ser. No. 09/540,371, filed Mar. 31, 2000, the entire contents of which is incorporated by reference herein for all purposes. This patent application also describes, for example, several alternative hold and release mechanism which could be used as the fine singulator of the present invention.

Detailed Description Text - DETX (39): FIGS. 11 and 12 illustrate an alternative form of cascaded conveyor system wherein a first, essentially horizontal conveyor 102' feeds to a series of inclined conveyors 103', 104' that form an upward ramp. The crossovers from one inclined conveyor to another help segregate items that are lined up in the lengthwise (conveying) direction. In one embodiment, inclined conveyors 103', 104' each include a plurality of parallel longitudinal conveying sections comprising parallel strip belts 120. The belts 120 of the ramped conveyors 103', 104' are controlled individually so that some parcels or items are moving upwards on active belts 121 while

others remain stationary on idle belts 122. Belts 120 can be controlled by a vision and control system 123 as described herein that identifies the lead parcel for each section and the belts which support items, running those while others remain idle. The vision and control system 123 may also be used to detect doubles and operate selected belts 120 to separate clustered items.

Detailed Description Text - DETX (41): When used as part of a feeder/reader subsystem as shown in FIGS. 1A, 1B, the foregoing recirculation loop would be positioned as indicated to replace singulator 33 and conveyor 34. In this connection, it should be noted that the edging divert module 37 following the scanning tunnel 35 or alternatively, an RFID station, may have essentially the same construction as the edging divert conveyor 58', but is controlled differently, namely to divert objects which prove to be non-machinable based on weight and/or size as measured in tunnel 35. In the alternative, an arrangement could be employed wherein the scanning tunnel 35 receives mail pieces 64 directly from the doubles detection conveyor 59, and the edging divert conveyor 58' is located immediately downstream from scanning tunnel 35.

Claims Text - CLTX (1): 1. An apparatus for feeding a stream of articles to a sorter comprising; an infeed conveyor; a detection system configured to determine the spacing and number of articles on the infeed conveyor, the detection system controlling the rate at which articles are loaded onto the infeed conveyor, the detection system comprising a vision system which monitors the number of articles present in each of a plurality of areas of the infeed conveyor; a singulator, the singulator receiving a disordered stream of non-flat, three dimensional articles from the infeed conveyor and spacing the articles for transfer from the singulator one at a time; a scanner, the scanner receiving articles from the singulator and scanning a plurality of sides of the article for destination indica, the scanner generating a signal corresponding to the scanned indica; and a diverter, the diverter directing selected articles in response to the signal generated by the scanner.

US-PAT-NO: 6521854
DOCUMENT-IDENTIFIER: US 6521854 B2
TITLE: Article classifying system
DATE-ISSUED: February 18, 2003
INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Tanimoto; Michiaki	Takasago	N/A	N/A	JP

US-CL-CURRENT: 209/586, 209/592 , 209/645 , 209/900

ABSTRACT: An article classifying system includes a conveyor 9 for conveying mail pieces 1, a weighing conveyor 18, and a sorting conveyor 26. A length measuring unit 5 measures the length of the mail pieces while they are being conveyed by the conveyor 9. Also, the width and the thickness of the mail pieces are measured by a width measuring unit 4 and a thickness measuring unit 3. The weight of the mail pieces is measured by a weighing unit 6 while the mail pieces are being conveyed on the weighing conveyor 18. Then, a control unit classifies the mail pieces into categories according to their length, width, thickness and weight.
22 Claims, 10 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 7

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Detailed Description Text - DETX (62): In place of bar codes, the senders and the addressees may be represented by OCR characters which an optical character reader (OCR) can read. Such OCR characters representing senders and addressees are read in by an optical scanner. The scanner is disposed in association with the conveyor 9.

Claims Text - CLTX (15): 15. The article classifying system according to claim 12 further comprising: a sender scanning device for reading a representation of a sender indicated on each article; and a first counter for counting numbers of the articles for respective senders.

Claims Text - CLTX (16): 16. The article classifying system according to claim 15 further comprising: an addressee scanning device for reading a representation of an addressee indicated on each article; and a second counter for counting numbers of the articles for respective addressees.

Claims Text - CLTX (17): 17. The article classifying system according to claim 12 further comprising: an addressee scanning device for reading a representation of an addressee indicated on each article; and a counter for counting numbers of the articles for respective addressees.

Claims Text - CLTX (18): 18. The article classifying system according to claim 12 further comprising: an addressee scanning device for reading a representation of an addressee indicated on each article; and a memory for storing the addressee of each article as read by said scanning device together with the category of that article as classified by said computer unit.

DIALOG 31 JANUARY 2005

File 2:INSPEC 1969-2005/Jan W4 (c) 2005 Institution of Electrical Engineers
File 9:Business & Industry(R) Jul/1994-2005/Jan 31 (c) 2005 The Gale Group
File 15:ABI/Inform(R) 1971-2005/Jan 31 (c) 2005 ProQuest Info&Learning
File 16:Gale Group PROMT(R) 1990-2005/Jan 31 (c) 2005 The Gale Group
File 20:Dialog Global Reporter 1997-2005/Jan 31 (c) 2005 The Dialog Corp.
File 35:Dissertation Abs Online 1861-2005/Jan (c) 2005 ProQuest Info&Learning
File 65:Inside Conferences 1993-2005/Jan W5 (c) 2005 BLDSC all rts. reserv.
File 99:Wilson Appl. Sci & Tech Abs 1983-2004/Nov (c) 2004 The HW Wilson Co.
File 148:Gale Group Trade & Industry DB 1976-2005/Jan 28 (c)2005 The Gale Group
File 160:Gale Group PROMT(R) 1972-1989 (c) 1999 The Gale Group
File 256:TecInfoSource 82-2004/Dec (c) 2004 Info.Sources Inc
File 275:Gale Group Computer DB(TM) 1983-2005/Jan 31 (c) 2005 The Gale Group
File 347:JAPIO Nov 1976-2004/Aug(Updated 041203) (c) 2004 JPO & JAPIO
File 348:EUROPEAN PATENTS 1978-2005/Jan W03 (c) 2005 European Patent Office
File 349:PCT FULLTEXT 1979-2002/UB=20050127,UT=20050120 (c) 2005 WIPO/Univentio
File 474:New York Times Abs 1969-2005/Jan 29 (c) 2005 The New York Times
File 475:Wall Street Journal Abs 1973-2005/Jan 28 (c) 2005 The New York Times
File 476:Financial Times Fulltext 1982-2005/Jan 31 (c) 2005 Financial Times Ltd
File 583:Gale Group Globalbase(TM) 1986-2002/Dec 13 (c) 2002 The Gale Group
File 610:Business Wire 1999-2005/Jan 31 (c) 2005 Business Wire.
File 613:PR Newswire 1999-2005/Jan 31 (c) 2005 PR Newswire Association Inc
File 621:Gale Group New Prod.Annou.(R) 1985-2005/Jan 31 (c) 2005 The Gale Group
File 624:McGraw-Hill Publications 1985-2005/Jan 31 (c) 2005 McGraw-Hill Co. Inc
File 634:San Jose Mercury Jun 1985-2005/Jan 29 (c) 2005 San Jose Mercury News
File 636:Gale Group Newsletter DB(TM) 1987-2005/Jan 31 (c) 2005 The Gale Group
File 810:Business Wire 1986-1999/Feb 28 (c) 1999 Business Wire
File 813:PR Newswire 1987-1999/Apr 30 (c) 1999 PR Newswire Association Inc

Set	Items	Description
S1	57287	(FEED???) (5N) (TRANSPORT???? OR CONVEY??? OR MOV???)
S2	229262	(SCAN???? OR IMAG???? OR OPTIC????) (5N) (TRANSPORT???? OR CONVEY??? OR MOV???)
S3	79720	(LABEL???? OR PRINT????) (5N) (TRANSPORT???? OR CONVEY??? OR MOV???)
S4	1142	S1 AND S2 AND S3
S5	264495	(SCAN???? OR IMAG???? OR OPTIC????) (5N) (RETURN OR SENDER OR ADDRESSER OR ORIGIN)
S6	39751	(SCAN???? OR IMAG???? OR OPTIC????) (5N) (ADDRESS OR ADDRESSEE OR RECIPIENT OR DESTINATION)
S7	4649	S5 AND S6
S8	209141	(SCAN???? OR IMAG???? OR OPTIC????) (5N) (NOTIF???????? OR INDICAT???? OR ANNOUNC??????)
S9	2667	S6 (5N) (CHANG???? OR MODIF???????? OR ALTER?????? OR NEW OR CORRECT???? OR FORWARD????)
S10	69894	(RETURN OR SENDER OR ADDRESSER OR ORIGIN) (5N) (NOTIF??? OR INDICAT???? OR ANNOUNC??????)
S11	4418	(S8 OR S9) (S) S10
S12	37	S4 AND S7
S13	15	S4 AND S11
S14	251	S7 AND S11
S15	295	S12 OR S13 OR S14
S16	290	RD S15 (unique items) [Scanned ti,kwic all]